

REMARKS

The Applicants have studied the Office Action dated December 4, 2008. By this amendment, dependent claims 26, 27 and 28 are amended. As these amendments were for the sole purpose of correcting antecedent basis, no new matter was added. No claims are canceled. No new claims are added. After this amendment, claims 21-28, 30-32 and 35 remain pending. Applicants respectfully request entry of these remarks under the provisions of 37 C.F.R. § 1.116(a) in that the remarks below place the application and claims in condition for allowance, which allowance is respectfully requested. Reconsideration and allowance of the pending claims in view of the above amendments and the following remarks are respectfully requested.

In the Office Action, the Examiner:

(The bolded numbers in parenthesis refers to paragraph numbers of the Office Action.)

- (1) Withdrew claims 1-8, 10-14, 17-19, 37-38 and 40-55 from consideration as being directed to a non-elected invention, under 37 CFR §1.142(b) and MPEP ¶821.03;
- (2-3) rejected claims 21-27 under 35 U.S.C. §102(b) as being anticipated by Kristensson ("Design and Evaluation of a Shorthand Aided Soft Keyboard");
- (4-5) rejected claim 28 under 35 U.S.C. §103(a) as being unpatentable over Kristensson ("Design and Evaluation of a Shorthand Aided Soft Keyboard") in view of Carman II (U.S. 5,454,046); and
- (6) rejected claims 30-32 and 35 under 35 U.S.C. §103(a) as being unpatentable over Kristensson ("Design and Evaluation of a Shorthand Aided Soft Keyboard") in view of Milewski et al., ("Medical Word Recognition Using a Computational Lexicon").

Telephonic Interview

As an initial matter, the Applicants would like to thank Examiner Lee for the telephonic interview held on December 16, 2008. The Applicant's representative Jon Gibbons participated in the telephone call. The Applicants' representative discussed the Examiner's *sua sponte* election of claims 21-28, 30-32, and 35 and *sua sponte* withdrawal of claims 1-8, 10-14, 17-19, 37-38, 40-55 from consideration. No further agreement was reached.

(1) Election/Restrictions

As noted above, the Examiner withdrew claims 1-8, 10-14, 17-19, 37-38 and 40-55 from consideration as being directed to a non-elected invention, under 37 CFR §1.142(b) and MPEP ¶821.03. The Applicants respectfully disagree with the Examiner's contention that claims 1-8, 10-14, 17-19, 37-38 and 40-55 are directed to a non-elected invention, and hereby traverse this requirement for restriction.

In the previous Response, dated July 31, 2008, the Applicants amended pending claims 1, 2, 3, 6, 7, 8, 10, 11, 12, 17, 21, 22, 23, 30, 31, 32, 35 and 37. Further claims 9, 15, 16, 20, 29, 33, 34 and 36 were cancelled and new claims 43-55 have been added. The Applicants merely CLARIFIED, NARROWED AND AMENDED PREVIOUSLY EXAMINED claims for clarity to further prosecution. Hence the Applicants did not switch from one subject matter to another or resort to any subterfuge to keep the application pending. The Applicants amended previously examined claims to clarify the present invention. For Example in the July 31, 2008 Response with Amendment, the Applicants amended independent claims 1 and 37 to recite:

1. (As Amended On 7-31-08) A method of recognizing words, comprising:
 - defining word patterns of a plurality of known words by a plurality of paths, wherein each path connects elements in a word on a virtual keyboard, wherein the virtual keyboard contains a set of characters forming elements in the word without temporary target letters being placed adjacent to a current stroke location;
 - accepting a stroke as an input on the virtual keyboard layout; and
 - ~~recognizing a word pattern by processing the stroke using a combination of a plurality of channels that selectively process different aspects of the stroke in relation to the plurality of the paths on the virtual keyboard~~
 - processing the stroke using a combination of a plurality of channels, each channel selectively measuring a different aspect of the stroke's similarity to the plurality of the paths on the virtual keyboard; and
 - converting each different aspect of the stroke's similarity to probability estimates; mathematically integrating the probability estimates of the plurality of channels to

produce integrated probability estimates of candidate words.

37. (As Amended On 7-31-08) A method of recognizing words, the method comprising:
defining word patterns of a plurality of known words by a plurality of paths,
wherein each path connects elements in a word on a virtual keyboard, wherein the virtual
keyboard contains a set of characters forming elements in the word without temporary
target letters being placed adjacent to a current stroke location;
accepting a stroke as an input on the virtual keyboard layout; ~~and~~
recognizing a word pattern by processing the stroke using ~~[[a]]~~ at least one
location channel that selectively process different aspects of the stroke in relation to the
plurality of the paths on the virtual keyboard, the at least one location channel processing
a location-based similarity probability estimate;
determining a time spent inputting the stroke; and
modifying the location-based similarity probability estimate according to a path of
the stroke on the virtual keyboard and the time spent inputting the stroke, to produce an
output of the at least one location channel.

The Examiner then goes on to elect independent claim 21 (and withdraw independent
claims 1 and 37 from Examination)

21. (As Amended On 7-31-08) A shorthand symbol system for recognizing words,
comprising:
a graphical keyboard layer for accepting a stroke as an input trace, wherein the
keyboard layer contains a set of characters forming elements in the word without
temporary target letters being placed adjacent to a current stroke location;
a storage for storing word patterns of a plurality of paths, wherein each path
connects a set of letters received from the graphical keyboard layer; ~~and~~
a pattern recognition engine that recognizes a word pattern by processing the
stroke using a combination of a plurality of channels ~~that~~, each channel selectively
~~process processing a different aspects aspect~~ of the input trace in relation to the plurality
of the paths on the graphical keyboard layer, one channel of the plurality of channels

processing a location-based similarity probability estimate; and
a computer for mathematically integrating outputs of the plurality of channels to
produce an integrated probability estimate of a candidate word.

Independent claim 21 has been previously amended to clarify how the candidate word is selected. This selection is further clarified in previously amended independent claims 1 and 37. Independent claims 1, 21 and 37 have been clarified to recite how the method of recognizing words is carried out. This invention is the identical invention that the applicants have been prosecuting since filing, i.e., recognizing word patterns in a very large vocabulary system on a virtual keyboard. Thus, it is respectfully submitted that the election by the Examiner of only claims 21-28, 30-32, and 35 and the Final status of the Office Action is in error and should be withdrawn. See MPEP § 706.07.

Further, assuming *arguendo* that the Examiner election to restrict out only newly added claims 43-55 is proper, which the Applicants respectfully maintain is not proper, the Examiner should have only restricted out these newly added claims rather than restricting out previously pending claims 1-8, 10-14, 17-19, 37-38 that have been amended for clarity. The Applicants respectfully request reexamination and consideration of all previously pending claims.

If the Examiner does not withdraw the Final status of the Office Action and reexamine all previously pending claims, Applicants submit that this response does not raise new issues in the application. It is submitted that the present response places the application in condition for allowance or, at least, presents the application in better form for appeal. Entry of the present response is therefore respectfully requested.

(2-3) Rejection under 35 U.S.C. §102(b)

Before discussing in detail the specific rejections, it is believed that a brief review of the art cited by the Examiner would be helpful. Kristensson uses only a crude form of location

information, which consists of the location of the bounding box of a gesture as a post-processing step to disambiguate candidates with identical and or nearly identical matching scores according to “normalized shape” information. (see Section 3.5.2, “Partial Location Dependency” of Kristensson, which is a sub-section of 3.5, “Resolving Ambiguity”). The term “normalized shape” means all stroke are transformed to the same origin and the same size; thereby deliberately removing location information (see Kristensson Figure 4-4). Kristensson does not use probability estimates to do a true mathematical integration. The power of the method of Kristensson is very limited. For example, suppose A and B are two candidates and S is a stroke drawn by a user. If A and B have a same matching distance to S in shape space, but A is closer to S in location, then A can be selected in the post-processing step of Kristensson. However, if A is farther away from S than B is from S in shape space, then A will not be selected as a final top candidate, regardless if A is much closer to S than B is to S in location.

On the other hand, in the Applicants’ invention, shape and location each produces candidate words with different matching scores that are converted to probabilities that are later mathematically integrated into one ranked list. Using the same example above, if A is somewhat farther away to S than B is, but A is much closer to S than B is in location space, then A may still be selected as the final top candidate, depending the relative weight of the two channels. The Applicants’ invention comprises a systematic method of converting matching scores to probability estimates, and then integrates them in a mathematical and probabilistic framework.

The last three elements of independent claim 21 recite as follows:

“a storage for storing word patterns of a plurality of paths, wherein each path connects a set of letters received from the graphical keyboard layer;

a pattern recognition engine that recognizes a word pattern by processing the stroke using a combination of a plurality of channels, each channel selectively processing a different aspect of the input trace in relation to the plurality of the paths on the graphical keyboard layer, one channel of the plurality of channels processing a location-based similarity probability estimate; and

a computer for mathematically integrating outputs of the plurality of channels to produce an integrated probability estimate of a candidate word.”

The last three elements of claim 21 are not taught or disclosed by Kristensson. The Examiner cites 35 U.S.C. § 102(b) and a proper rejection requires that a single reference teach (i.e., identically describe) each and every element of the rejected claims as being anticipated by Kristensson.¹ The apparatus of Kristensson does not mathematically integrate outputs of the plurality of the channels to produce an integrated probability estimate of a candidate word. Accordingly, claim 21 distinguishes over Kristensson for at least this reason.

As noted above, the Examiner rejected claims 21-27 under 35 U.S.C. §102(b) as being anticipated by Kristensson. The second element of independent claim 21 recites as follows:

“a storage for storing word patterns of a plurality of paths, wherein each path connects a set of letters received from the graphical keyboard layer;”

In rejecting the second element of independent claim 21, the Examiner stated that “*a storage for storing word patterns of a plurality of paths*” is anticipated by a “ThreadDataExchange” in Figure B-3 of Kristensson. For convenience, Figure B-3 of Kristensson is reproduced below in its entirety.

¹ See MPEP ¶2131 “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” [Emphasis Added] *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). “The identical invention must be shown in as complete detail as is contained in the ... claim.”

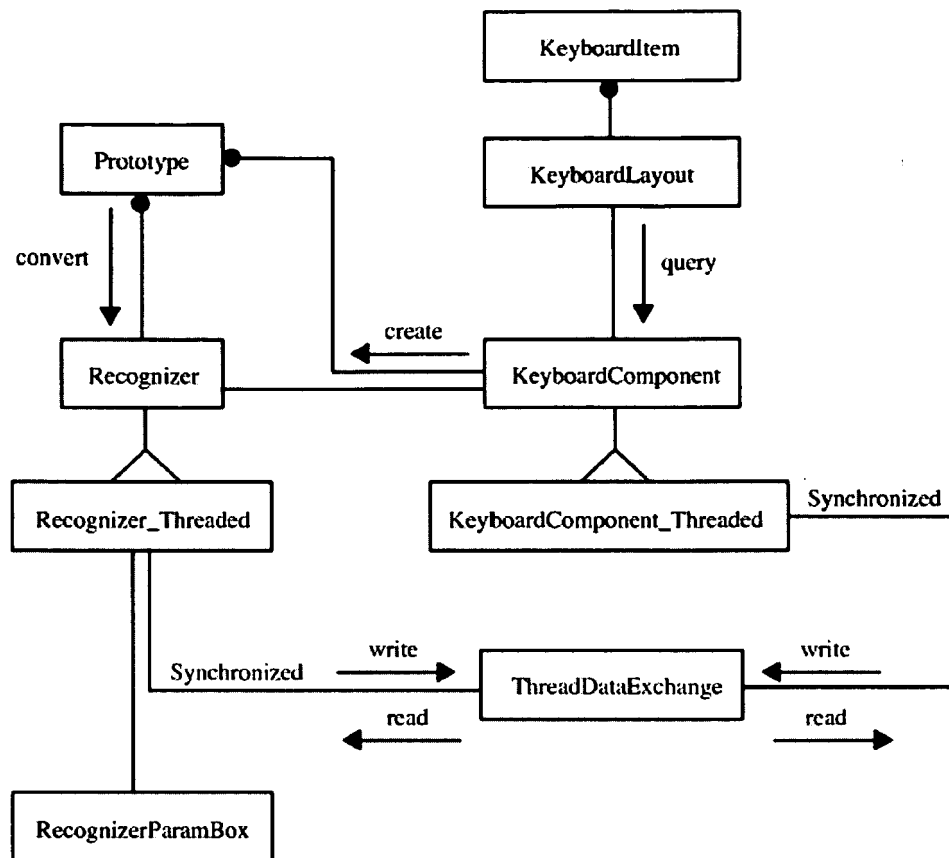


Figure B-3 UML chart of the SHARK system.

Other than the appearance of a “ThreadDataExchange” block in Figure B-3 of Kristensson, the “ThreadDataExchange” is not discussed or explained in Kristensson reference. In other words, neither the purpose nor the structure of the “ThreadDataExchange” is revealed. Kristensson fails to state that the “ThreadDataExchange” is a storage. Even assuming, *arguendo*, that the “ThreadDataExchange” is a storage, Kristensson utterly fails to disclose what is stored in such storage. For example, Kristensson does not state that word patterns are stored in the “ThreadDataExchange”. Therefore, the Applicants respectfully disagree with the Examiner’s contention that the “ThreadDataExchange” block in Figure B-3 of Kristensson discloses a “a storage for storing word patterns of a plurality of paths”, as recited in the second element of claim 21. Therefore, claim 21 should be allowed for at least the foregoing reason.

The fourth element of independent claim 21 recites as follows:

“a computer for mathematically integrating outputs of the plurality of channels to produce an integrated probability estimate of a candidate word.”

The Examiner stated that the fourth element of independent claim 21 is anticipated by Figure 4-7 of Kristensson and by Chapter 4.2.2.1, “Dynamic time warping algorithm” of Kristensson. For convenience, Figure 4-7 of Kristensson is reproduced below in its entirety.

```
function MIN-DISTANCE(unknown, prototype) returns min-distance
n ← LENGTH(unknown)
m ← LENGTH(prototype)
Create a distance matrix distance[n+1,m+1]
distance[0,0] ← 0
for each column i from 0 to n do
  for each row j from 0 to m do
    distance[i,j] ← COST[unknowni,prototypej] + MIN(distance[i-1,j],
                                                    distance[i-1,j-1],
                                                    distance[i,j-1])
return(distance[n,m])
```

Figure 4-7 Dynamic time warping algorithm.

Chapter 4.2.2.1, of which Figure 4-7 is a part, is entitled “Elastic Matching of two Curves”, and this chapter describes how a curve *u* that has an unknown shape can be matched to a known candidate curve *k*. Figure 4-7 merely sets forth an algorithm for determining shape information. Therefore, chapter 4.2.2.1 and Figure 4-7 refers to shape information but only to shape information (and to no other type of information). Therefore, chapter 4.2.2.1 and Figure 4-7 refers, at most, to only one channel of a possible plurality of channels, wherein that one channel is a shape information channel. In other words, chapter 4.2.2.1 and Figure 4-7 do not describe a situation of more than one channel, (e.g., a plurality of channels), as recited in the fourth element of claim 21. For example, chapter 4.2.2.1 and Figure 4-7 do not refer to other channels of a plurality of channels, such as a location information channel, a tunnel model

channel, or a language context channel. Therefore, the portions of Kristensson cited by the Examiner in rejecting claim 21 do not disclose “*a computer for mathematically integrating outputs of the plurality of channels*”, as recited the fourth element of claim 21. Therefore, claim 21 should be allowed for at least the foregoing reason.

In rejecting claim 23, the Examiner stated that “*path location information regarding sampling points of the stroke, each sampling point having a weight*” is disclosed by equations 4.5 and 4.6 of Kristensson, and by chapter 4.2.3.1, “Point-to-point Distance”, of Kristensson. However, Kristensson merely uses a “bounding box” of a gesture to determine location information. For example, chapter 4.2.3, entitled “Distance Metrics”, and the equations contained in this chapter, describe a simple point-to-point distance between a data point *i* of a prototype stroke and a data point *j* of an unknown stroke. More specifically, equation 4.5 describes the squared Euclidian distance between said points. To put lesser emphasis on points farther from the prototype, equation 4.6 describes the Euclidian distance between said points. Equation 4.7 measures the distance and also takes into account the angle difference between said points. Most importantly, Kristensson fails to assign different weights to different sampling points of the stroke. Clearly, equations 4.5, 4.6 and 4.7 of Kristensson are totally devoid of any variables representing weights. In contrast, the Applicants’ invention represents location information from the beginning to the end of a stroke with different weights at each sampling point of the stroke. Therefore, claim 23 should be allowed.

In rejecting claim 24, the Examiner stated that “*wherein the plurality of channels comprises a tunnel channel model channel*” is disclosed by Appendix B and in Figure B-2, “notepad GUI”, of Kristensson. Figure B-2 of Kristensson illustrates the trace for the word “then” inside the keys ‘T’, ‘H’, ‘E’ and ‘N’. This is only coincidental (note that the figure text for Figure B-2 simply states “Notepad GUI”. Nowhere in Appendix B or Figure B-2 is the word “tunnel” mentioned. Furthermore, nowhere in Appendix B or Figure B-2 is the tunnel channel concept discussed using any other terminology. Except for a single appearance of the word in chapter 3.3 when discussing the prior art, Kristensson does not discuss the tunnel channel constraint. Therefore, claim 24 should be allowed.

In rejecting claim 25, the Examiner stated that “*wherein the plurality of channels comprises a language context channel*” is disclosed by Appendix D of Kristensson. If the

Examiner were to look at Appendix D again, the Applicants are sure that the Examiner will notice that Appendix D does not disclose a “*language context channel*”, as recited in claim 25. There is nothing in Kristensson that argues for using a language model, as the term “language model” is defined in the Applicants’ patent application. For example, the Applicants’ patent application states,

“The present system uses language rules to recognize suffixes and connect suffixes with a preceding word, allowing users to break complex words into easily remembered segments.” (Emphasis added) See paragraph [0018] of the Applicants’ Published Patent Application 2005/0190973 A1.

“Several other factors can also contribute the overall likelihood of a word, such as the language context (proceeding words), etc.” (Emphasis added) See paragraph [0025] of the Applicants’ Published Patent Application 2005/0190973 A1.

“The language model channel 235 provides context clues to the integrator 230 based on previous words gestured by the user.” (Emphasis added) See paragraph [0046] of the Applicants’ Published Patent Application 2005/0190973 A1.

“When a suffix is detected by integrator 230, integrator 230 obtains the previous word from the language model channel 235. If the previous word and the suffix match, they are connected according to rules in the lexicon 225. The rules can be any set of instructions feasible for connecting a word stem and a suffix. For example, the rule for connecting “compute” and “tion” is to delete the previous character (e.g., “e”), insert “a”, and insert the suffix.” (Emphasis added) See paragraph [0096] of the Applicants’ Published Patent Application 2005/0190973 A1.

Finally, Appendix D of Kristensson is simply a list of words and their shapes, and does not suggest, teach or disclose how to integrate language modeling information into a recognizer’s metric. Therefore, claim 25 should be allowed.

Claims 22-28, 30-32 and 35 depend from independent claim 21. Because dependent claims contain all the limitations of the independent claims, it is believed, for at least this reason, that claims 22-28, 30-32 and 35, distinguish over Kristensson, as well.

For the reasons set forth above, the Applicants believe that the rejection of claims 21-27 under 35 U.S.C. §102(b) has been overcome.

(4-5) Rejection under 35 U.S.C. §103(a)

As noted above, the Examiner rejected claim 28 under 35 U.S.C. §103(a) as being unpatentable over Kristensson ("Design and Evaluation of a Shorthand Aided Soft Keyboard") in view of Carman II (U.S. 5,454,046). The Applicants agree with the Examiner that Kristensson does not disclose the limitations of claim 28. However, the Applicants disagree with the Examiner that the Kristensson reference taken in view of Carman II discloses the limitations of claim 28. The fourth element of independent claim 21 recites as follows:

"a computer for mathematically integrating outputs of the plurality of channels to produce an integrated probability estimate of a candidate word."

The fourth element of independent claim 21 is not taught or disclosed by Kristensson alone or in view of Carman II. Therefore, Kristensson reference taken alone and/or in view of Carman II simply does not suggest, teach or disclose the patentably distinct limitations of the elements in independent claim 21.

For the foregoing reasons, amended independent claim 21 distinguishes over Kristensson taken alone or in view of Carman II. Furthermore, claim 28 depends from independent claim 21. Because a dependent claim contains all the limitations of the independent claims, for at least this reason claim 28 distinguishes over Kristensson taken alone or in view of Carman II, as well.

For the reasons set forth above, the Applicants believe that the rejection of claims 28 under 35 U.S.C. §103(a) has been overcome.

(6) Rejection under 35 U.S.C. §103(a)

As noted above, the Examiner rejected claims 30-32 and 35 under 35 U.S.C. §103(a) as being unpatentable over Kristensson (“Design and Evaluation of a Shorthand Aided Soft Keyboard”) in view of Milewski et al., (“Medical Word Recognition Using a Computational Lexicon”).

The Applicants believe, for the reasons set forth above in the section entitled “(2-3) Rejection under 35 U.S.C. §102(e)”, that independent claim 21 distinguishes over Kristensson taken alone or in view of Milewski. Amended claims 30-32 and 35 depend from claim 21. Because dependent claims contain all the limitations of the independent claims, 30-32 and 35 distinguish over Kristensson taken alone or in view of Milewski, as well, and the Examiner’s rejection should be withdrawn.

Conclusion

In view of the preceding discussion, it is submitted that the claims are in condition for allowance. Allowance of claims 21-28, 30-32 and 35 is requested.

No amendment made was related to the statutory requirements of patentability unless expressly stated herein. No amendment made was for the purpose of narrowing the scope of any claim, unless the Applicants have argued herein that such amendment was made to distinguish over a particular reference or combination of references.

The Applicants acknowledge the continuing duty of candor and good faith to disclose information known to be material to the examination of this application. In accordance with 37 CFR §1.56, all such information is dutifully made of record. The foreseeable equivalents of any territory surrendered by amendment are limited to the territory taught by the information of record. No other territory afforded by the doctrine of equivalents is knowingly surrendered and everything else is unforeseeable at the time of this amendment by the Applicants and their attorneys.

The present application, after entry of this response, comprises twelve (12) claims, including one (1) independent claim. The Applicants have previously paid for forty-two (42) claims including three (3) independent claims. The Commissioner is hereby authorized to change any fees that may be required or credit any overpayment to Deposit Account **09-0441**.

PLEASE CALL the undersigned if the Examiner believes that there are any informalities that can be corrected by Examiner's amendment, or that in any way it would help expedite the prosecution of the patent application.

Respectfully submitted.

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